

REMARKS

This response is a resubmission of the Amendment After Final dated September 21, 2009, which Examiner refused to enter because of new issues raised by claims 60 and 80. This reply deletes these amendments, cancels claims, and rewrites claims in independent form.

The Examiner has rejected claims 1-2, 6, 7, 9-19, 26-40, 43, 45-49, 53, 55, 57-64, 67-70, 73, 74, 77-89 and 92-111 are under 35 U.S.C. §103(a) as being unpatentable over combinations of references that include Yao et al. U.S. Patent No. 6,051,114 (hereinafter "Yao") and Yasar et al. U.S. Patent Application Publication No. 2003/0034244 (hereinafter "Yasar").

Applicant is canceling all claims except claims 32, 33, 60, 80, and 94, which are being rewritten in independent form with no other changes. These claims have been rejected as unpatentable over Yao in view of Yasar. Applicant respectfully submits that the present amendment does not change the scope of the claims and should not require an additional search as Examiner has previously searched and commented on the patentability of the dependent claims, which are now independent. Entry of this amendment and reconsideration of the same is requested.

The present invention relates to ionized physical vapor deposition (IPVD) performed with a high-density inductively coupled plasma and a process useful for depositing ultra thin barrier and seed layers onto the surfaces of sub-micron, high aspect ratio features on substrates. The process includes the simultaneous depositing of material and the etching of the deposited material. This simultaneous process is accomplished by directing ions of the material onto the substrate for deposition while directing ions of gas onto the substrate for etching.

Yao deals with IPVD using a microwave ECR plasma to totally fill vias and trenches with metal, which is a process that would follow any process for depositing barrier or seed layers. Yao uses the directional IPVD to fill features while etching at the overhangs to prevent closing of the feature before the feature is filled.

The present invention deals with the entirely different problem of applying an ultra thin coating in the features, primarily on their sidewalls. While aspects of the solution are the same as

Yao's, the use of those aspects and the others claimed by Applicant to effectively coat feature sidewalls is unobvious. Yao notes in column 2, lines 40-49, of his patent that his invention applies to a fill process performed after a barrier layer is applied by conventional CVD. If it were obvious to Yao to use his invention for barrier layer application, he would not have used a very expensive additional module for the barrier layer process. Applicant's methods are not concerned with creating voids due to shadowing by overhangs, but in facilitating redistribution of barrier layer and seed layer material in the features.

Yasar deals with a problem that is more similar to Applicant's than is that of Yao. However, Yasar uses sequential deposition and etching and discusses how the process parameters are to be maintained entirely differently during the deposition steps than during the etching steps. Yasar uses higher deposition rates and higher pressures during its deposition step, and these parameters are incompatible with simultaneously etching.

It is submitted that the final rejection does not present a case of the obviousness of independent claims 32, 33 and 94. Accordingly, such claims should be allowed. For the same reason, the remaining dependent claims should be allowed as well.

A fee for a one month extension accompanies this amendment. Applicant believes that no other fees are due in connection with this submission. However, if any fees are necessary, the Commissioner may consider this to be a request for such and charge any necessary fees to deposit account 23-3000.

Respectfully submitted,

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